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E03D 9/052

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E1C C38

(56) Documents cited
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(58) Field of search
UK CL (Edition J) E1C
INT CL⁴ E03D

(54) Ventilating a water closet

(57) A water closet (2) comprising a toilet bowl (4), a cistern (6), a siphon flushing device (8) positioned in the cistern (6), an electrically powered extractor fan (10) positioned in the cistern (6) above the overflow level (12) of water in the cistern (6) when the water closet (2) is in use, first conduit means (16) extending from a part (18) of the siphon flushing device (8) that contains air when the cistern (6) contains water ready for flushing, second conduit means (32) extending from the extractor fan (10) to a water overflow pipe (34) for the cistern (6), and switch means (24) for causing operation of the extractor fan (10), the water closet (2) being such that during operation of the extractor fan (10) foul air from within the toilet bowl (4) is extracted via those apertures (28) around the rim (30) of the toilet bowl (4) that are provided for admitting flushing water to the toilet bowl (4) so that the foul air is vented to atmosphere by passing through the apertures (28), the first conduit means (16), the fan (10), the second conduit means (32) and the overflow pipe (34).

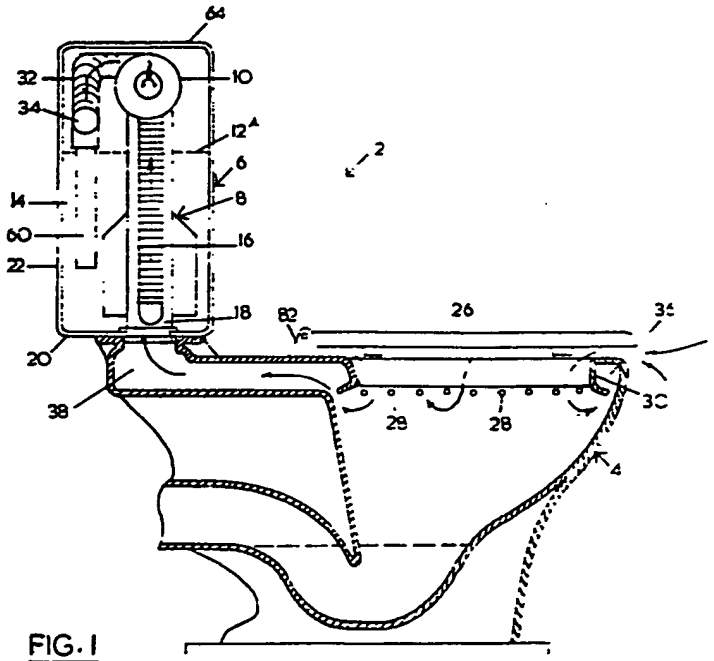

FIG. 1

At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

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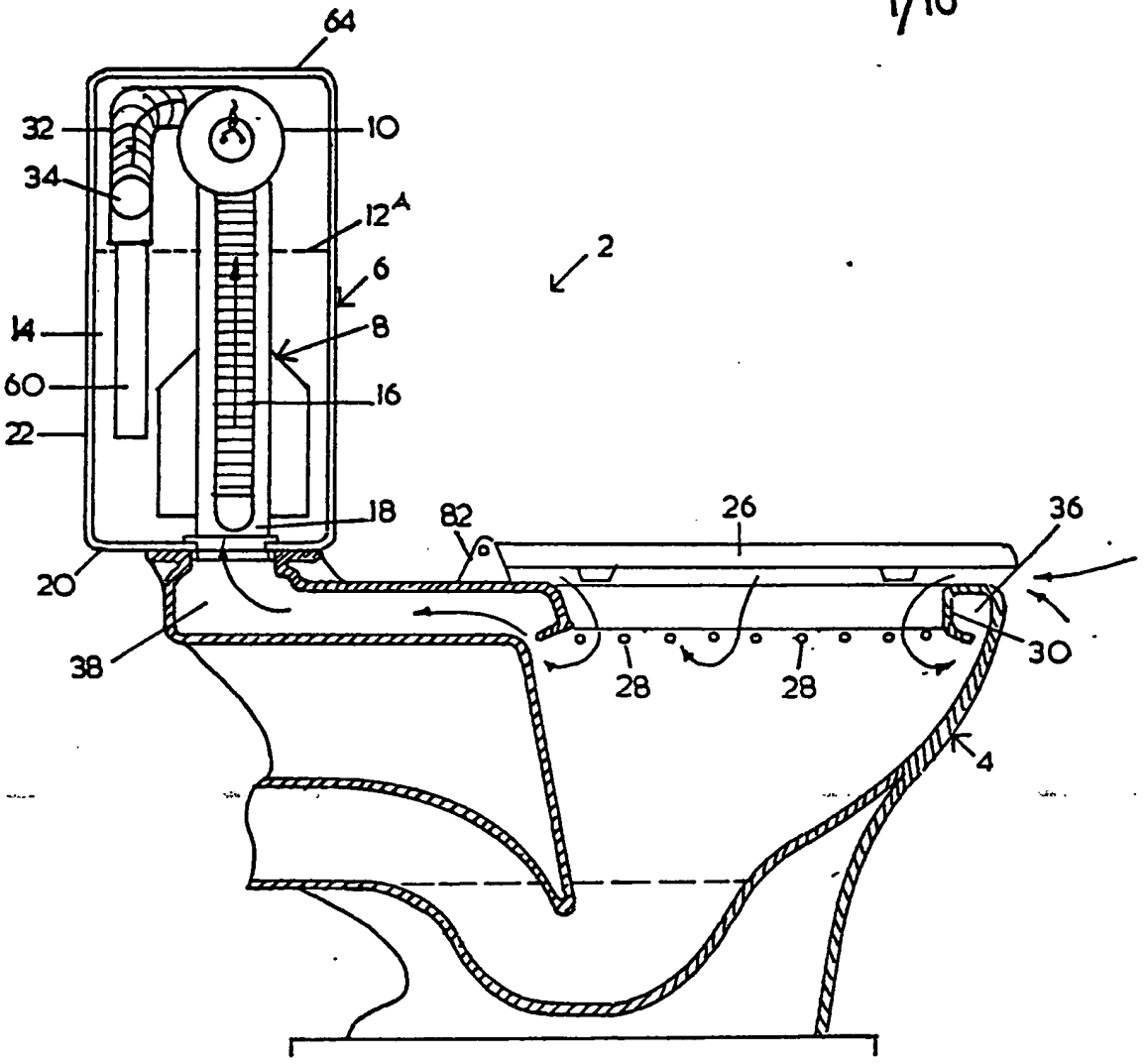

FIG. 1

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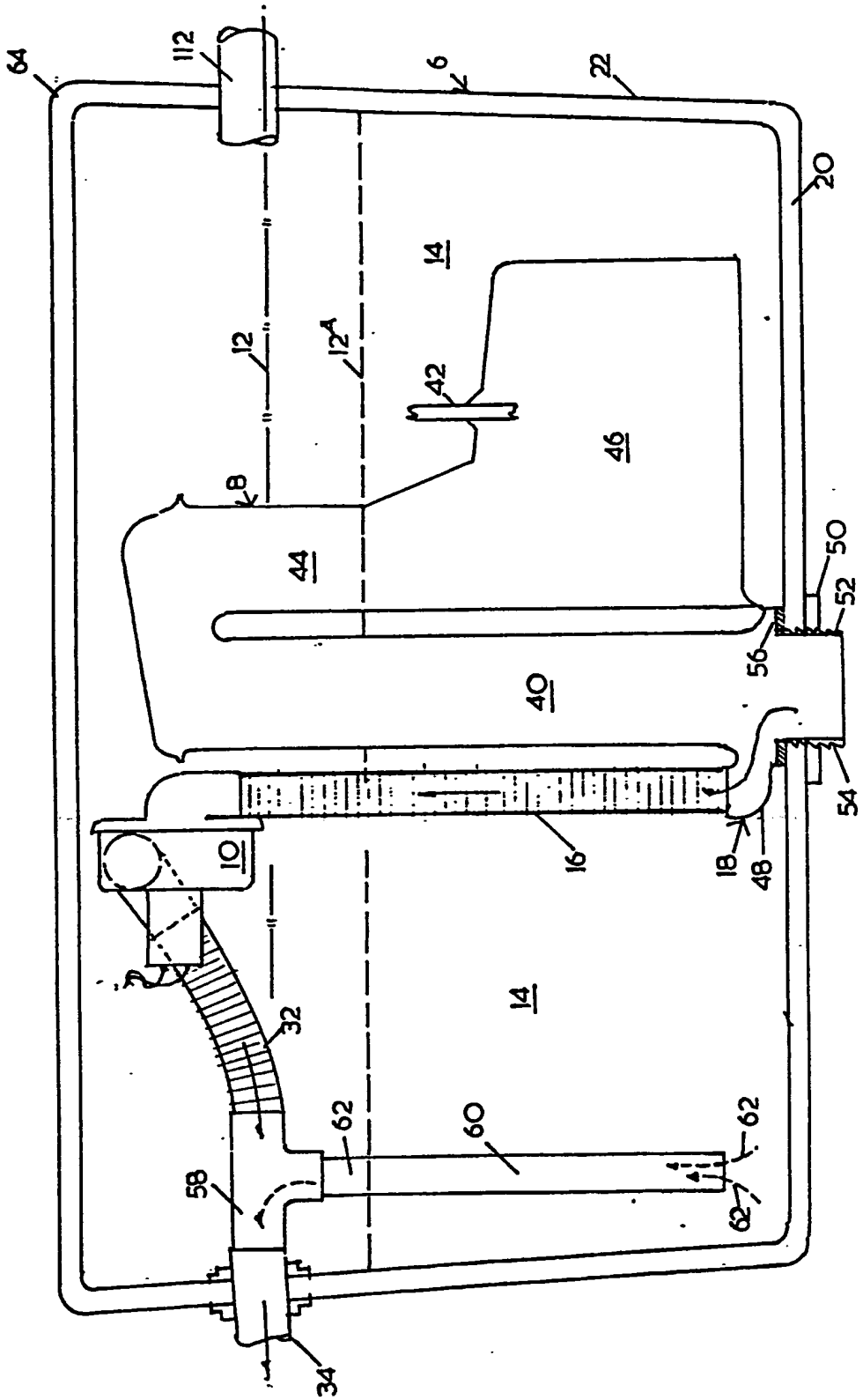

FIG. 2

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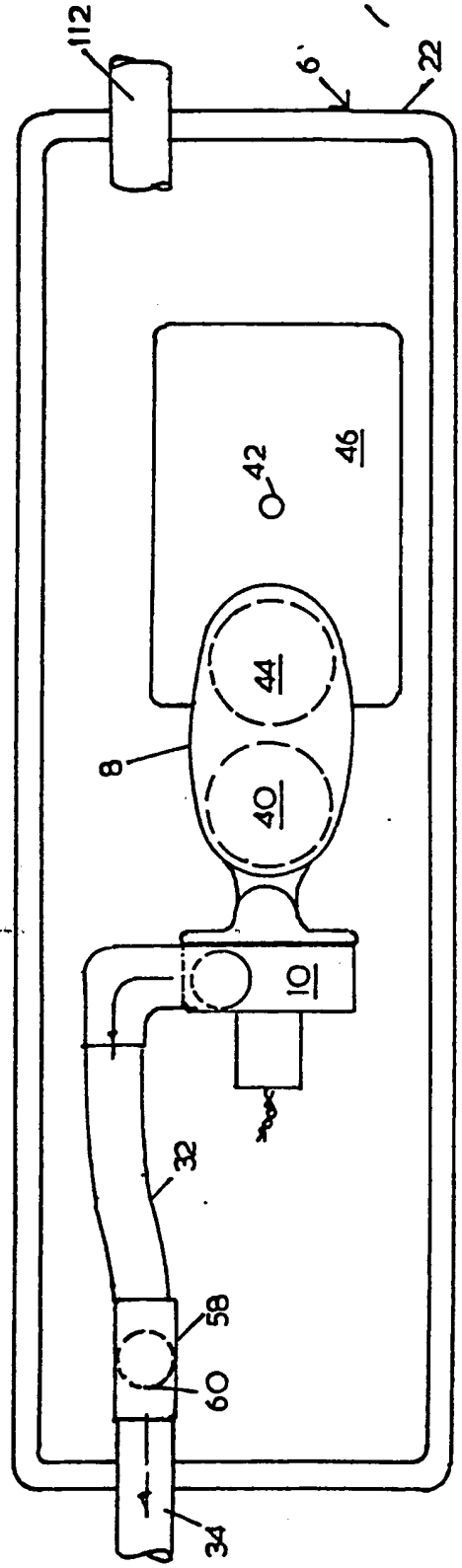


FIG.3

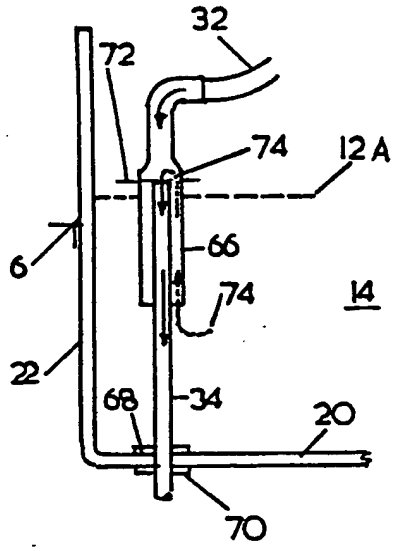
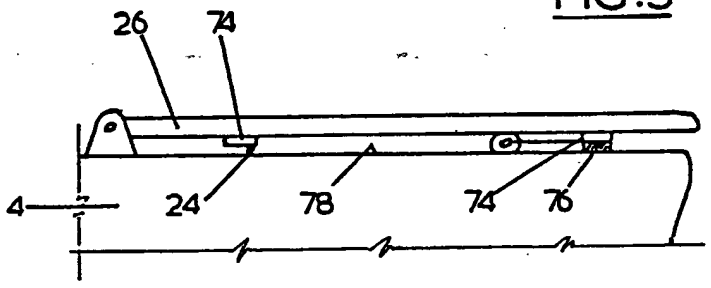


FIG.4

FIG.5



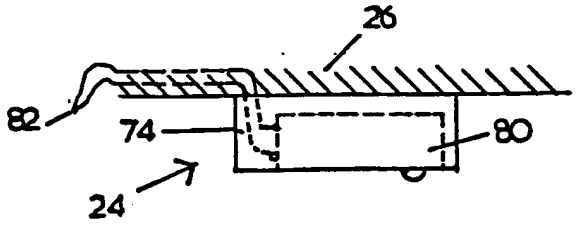


FIG.6

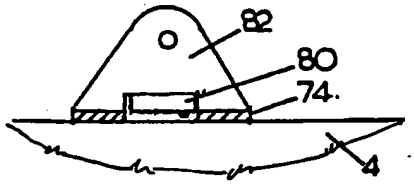


FIG.7

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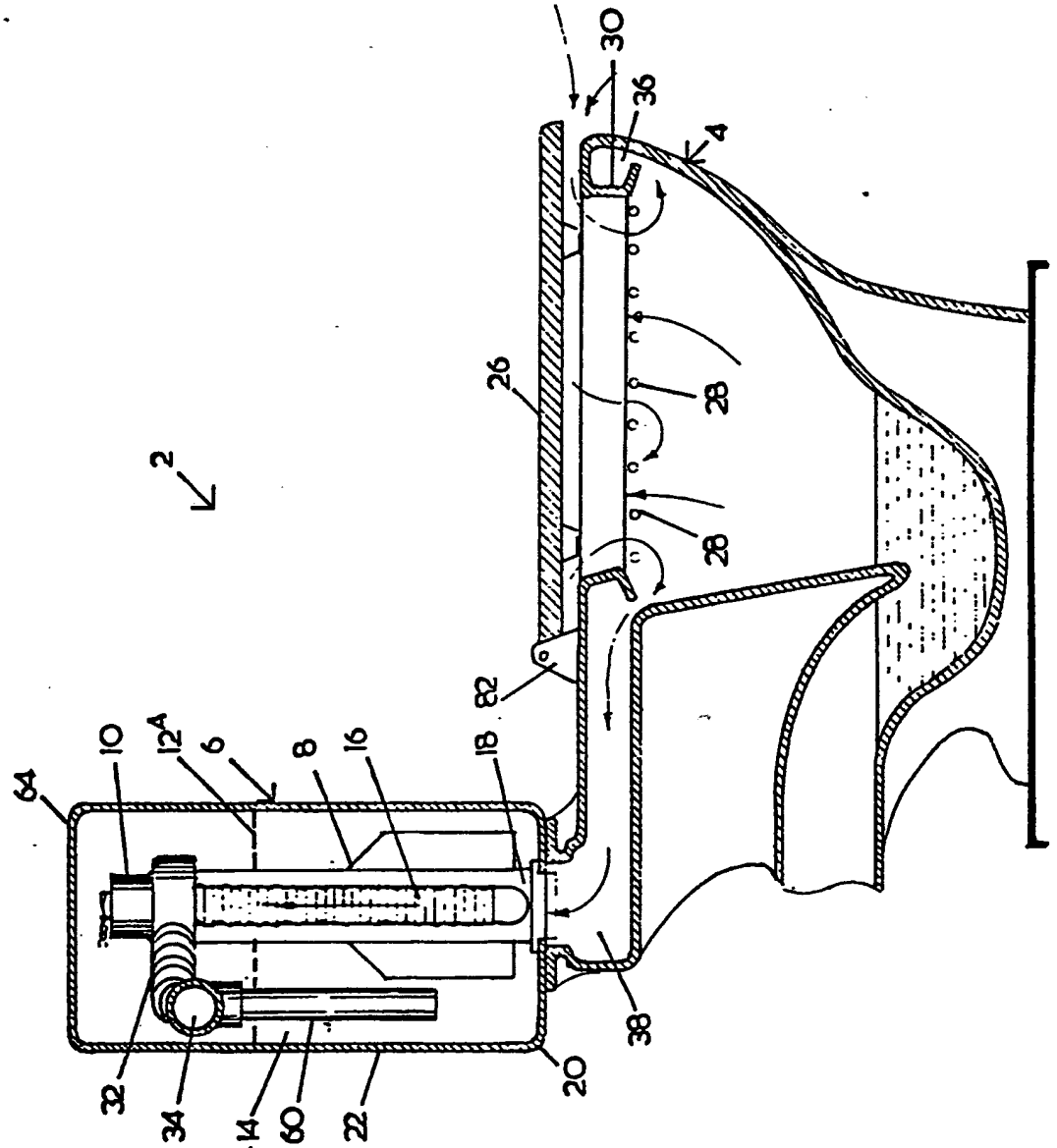

FIG. 8

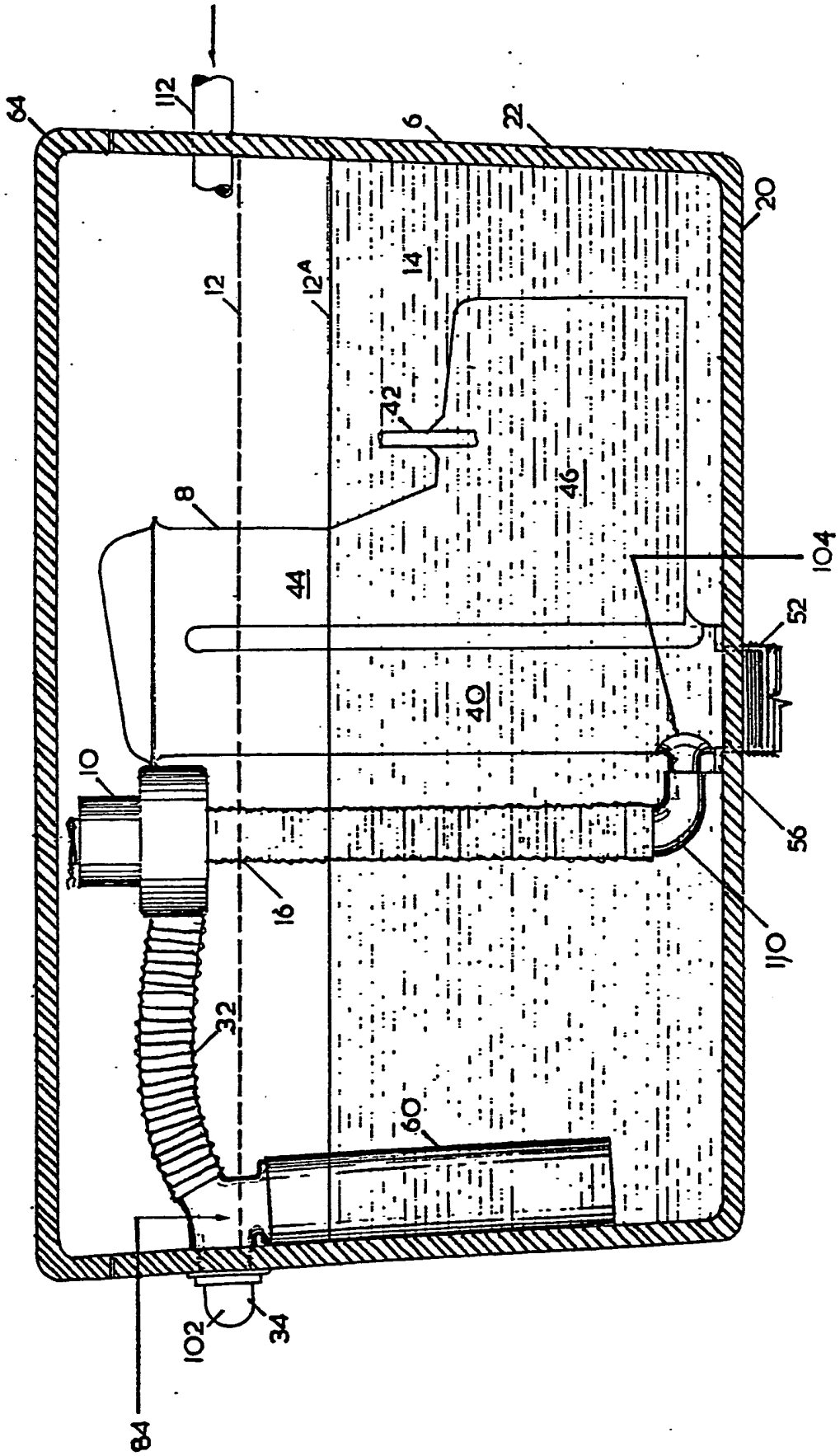
64
112
6
22
20
12
12A
14
42
46
8
44
104
52
40
10
56
16
110
32
60
102
34
84

FIG. 9

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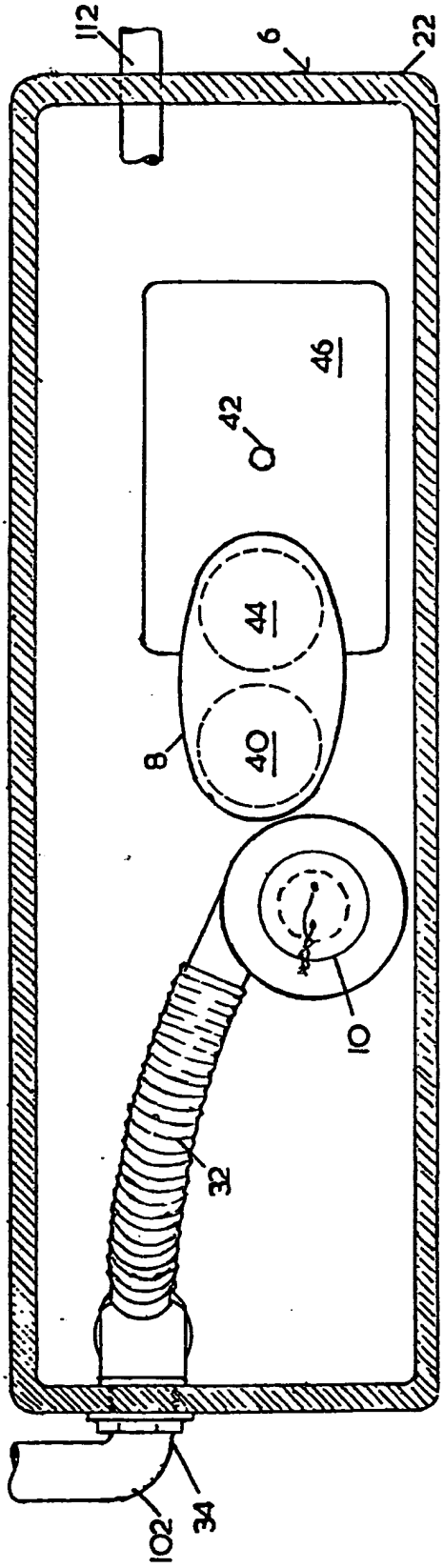

FIG. 10

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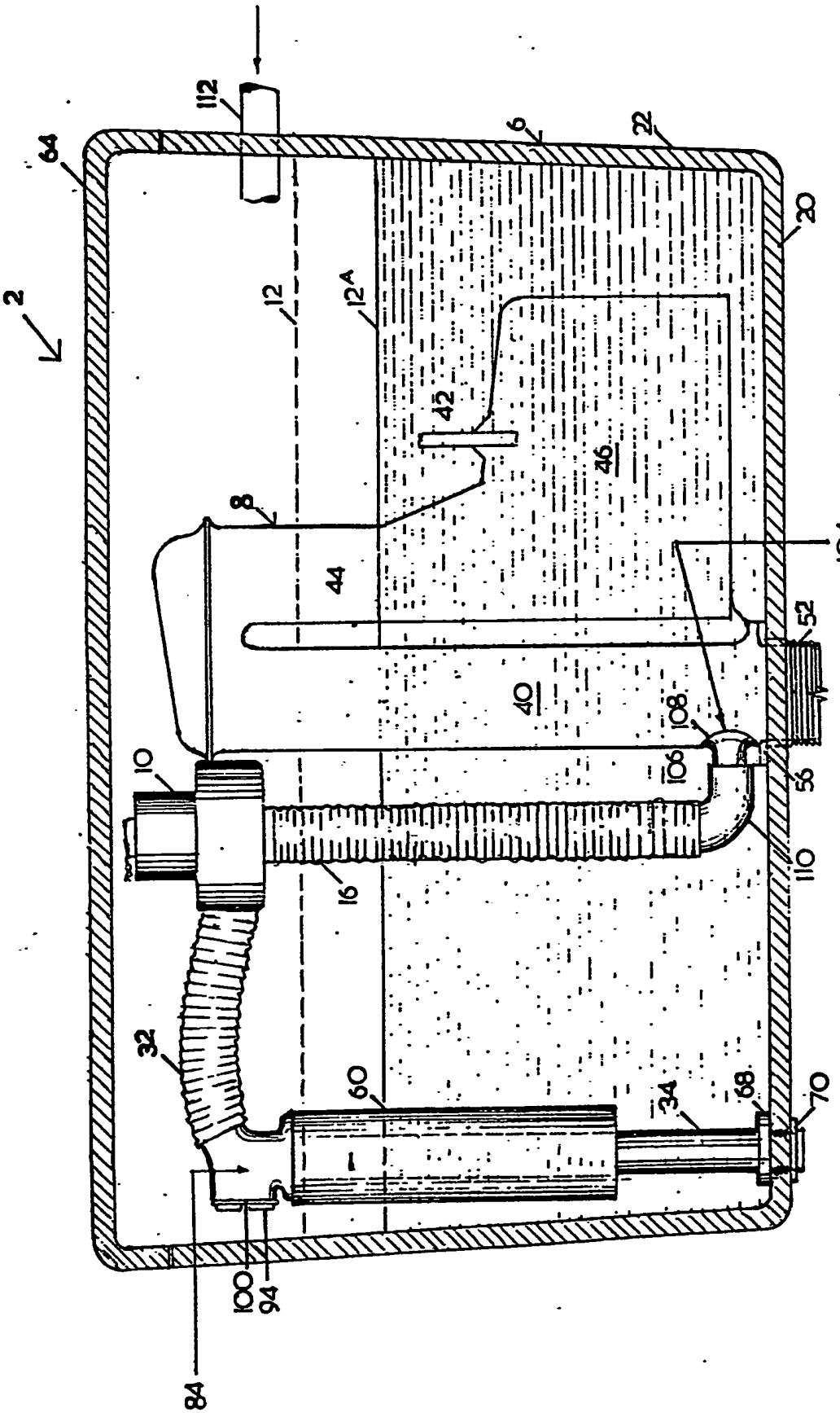

FIG. 11

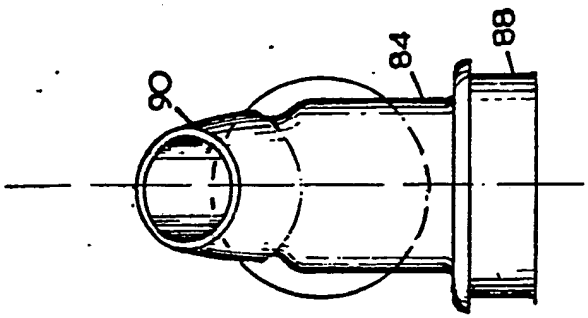

FIG. 13

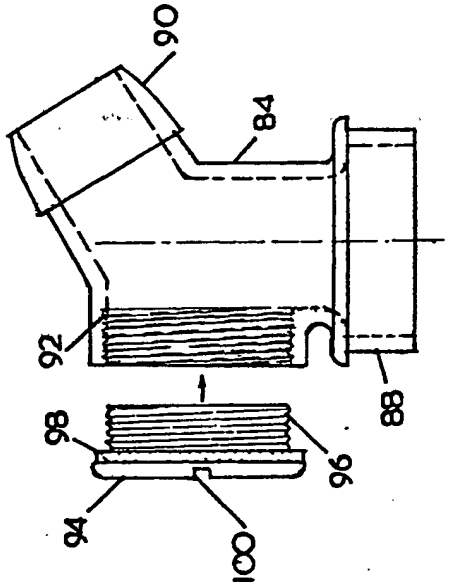

FIG. 12

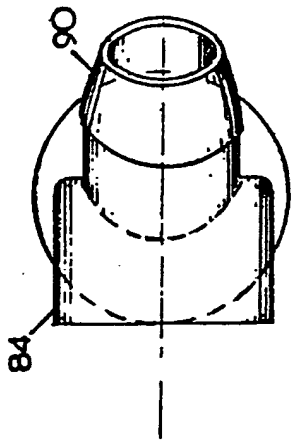

FIG. 14

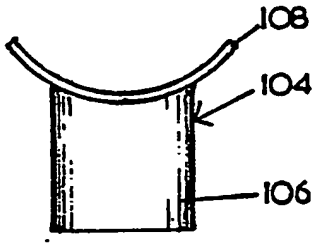

FIG.17

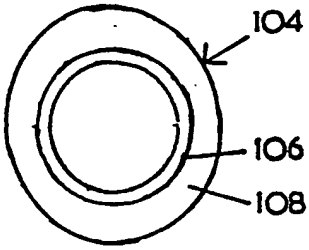

FIG. 16

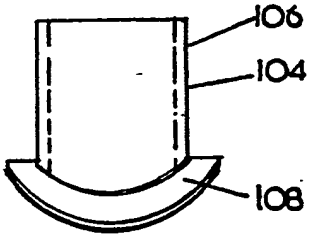

FIG. 15

A WATER CLOSET

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This invention relates to a water closet and, more especially, this invention relates to a water closet having means for extracting foul air from a toilet bowl part of the water closet.

When water closets are being used, foul air may be generated. In order to remove this foul air, it is usual to open windows or operate an extractor fan in a wall of a room in which the water closet is situated. The opening of windows and the operation of wall mounted extractor fans do not always sufficiently quickly remove the foul air and unpleasant draughts can also be caused, especially in winter. Chemical air freshening agents can be used to try and mask unpleasant smells but these are again often not satisfactory and at best merely replace one smell with another smell which is more pleasant but often over-powering.

The above mentioned problem has resulted in a number of known attempts to remove foul air from water closets by removing the foul air directly from the toilet bowl. These known attempts have not been accepted by manufacturers and, consequently, they have not reached the market so that water closets currently in use still have the problem of the foul air. It is believed that manufacturers have not taken up the various known ideas for removing foul air

from the toilet bowls of water closets because the known ideas have involved redesigning of the toilet bowl and/or the need to knock holes in the walls of rooms containing the water closets to provide ventilation outlets and for the provision of mains power. For example, one known water closet having means for removing foul air from the toilet bowl requires the toilet bowl to be produced with a completely new foul air passage and a space for a fan to vent the foul air to the soil waste pipe. In addition to the need to redesign the toilet bowl, there is a danger of foul air and/or sewer gases passing back from the waste pipe into the toilet bowl, which is clearly undesirable. Another known water closet arrangement is one which attempted to avoid the need for modifying the toilet bowl but it is one which only works with a push button gravity-type of flush and substantially all water closets in the United Kingdom are of the type requiring a siphon flushing device. Furthermore this latter known water closet still requires holes to be knocked in walls of rooms containing the water closet.

It is an aim of the present invention to provide a water closet which is able to remove foul air from the toilet bowl, which does not require the toilet bowl to be modified, and which employs a siphon flushing device.

Accordingly, this invention provides a water closet comprising a toilet bowl, a cistern, a siphon flushing device positioned in the cistern, an electrically powered extractor fan positioned in the cistern above the overflow level of water in the cistern when the water closet is in use, first conduit means extending from a part of the siphon flushing device that contains air when the cistern contains water ready for flushing, second conduit means extending from the extractor fan to a water overflow pipe for the cistern, and switch means for causing operation of the extractor fan, the water closet being such that during operation of the extractor fan foul air from within the toilet bowl is extracted via those apertures around the rim of the toilet bowl that are provided for admitting flushing water to the toilet bowl so that the foul air is vented to atmosphere by passing through the apertures, the first conduit means, the fan, the second conduit means and the overflow pipe.

The water closet of the present invention is such that only a small modification needs to be made to known siphon flushing devices in order to enable them to be adapted to operate in the water closet. Furthermore, the fan is unobtrusively positioned in the cistern and the foul air is removed via the existing water overflow pipe so that

there is no need to knock holes in walls to remove foul air. Thus, existing water closets in bathrooms and toilet rooms can easily be modified to enable the removal of foul air,and there will be no need to upset any existing decorations or tiling in the bathrooms or toilet rooms. New water closets being installed can obviously be those in accordance with the present invention, but the facility for modifying existing water closets provides an important advantage in view of the existing number of water closets in households and the fact that the water closets are not frequently renewed.

Preferably, the extractor fan is a battery powered extractor fan. If desired, however, the extractor fan may be mains operated. A 6 volt or a 9 volt operating voltage would enable either means of supply to be readily obtained and would be safe for use in toilets.

A battery or batteries for the battery powered extractor fan are preferably provided in a housing which may be positioned inside or outside the cistern. The use of a battery powered extractor fan eliminates the possibility of accidents due to electric shocks and can thus be fitted by any D.I.Y. enthusiast. However, a low voltage mains supply conforming to the appropriate British Standard may be used.

The first conduit means preferably connects to a lower part of the siphon flushing device adjacent to a bottom wall of the cistern.

The overflow pipe may extend through a side wall of the cistern above the normal level of water in the cistern. Alternatively, the overflow pipe may extend through a bottom wall of the cistern, the overflow pipe extending above the normal level of water in the cistern.

The second conduit means will usually be a separate piece of conduit which is connected to the overflow pipe. It is to be appreciated however that the second conduit means and the overflow pipe could be formed together in new water closets and thus the second conduit means and the overflow pipe would be different sections of the same conduit.

Preferably, the water closet is one in which the switch means is provided underneath a toilet seat or within a pivot support of the toilet seat, and in which the switch means is automatically activated when the toilet seat is sat on.

The switch means may be arranged automatically to stop when a person gets up from the toilet seat.

Usually, the switch means will be a pressure activated switch means. The switch means may be mounted such that a resilient pad compresses and allows contact to be made under the weight of a person sitting on the toilet seat. When the person gets up from the toilet seat, the resilient pad can flex back to its normal position which prevents electrical contact in the switch means being made. The resilient pad may be a

neoprene pad. Other flexible and resilient materials may be employed. Proximity or manual switches may also be used.

Preferably, the extractor fan is a centrifugal fan, for example of the type used in hair dryers which blow air. Various types of extractor fan may however be used.

Embodiments of the invention will now be described solely by way of example and with reference to the accompanying drawings in which:

Figure 1 is a side section through a first water closet in accordance with the invention;

Figure 2 is a front section through the cistern used in the water closet shown in Figure 1;

Figure 3 is a top view of the cistern as shown in Figure 2;

Figure 4 shows part of a second water closet in accordance with the invention and in particular shows an alternative way of connecting second conduit means to a water overflow pipe;

Figures 5 and 6 show first switch means;

Figure 7 shows second switch means which may be used as an alternative to the first switch means shown in Figures 5 and 6;

Figures 8, 9, and 10 show a third water closet which is like the water closet shown in Figures 1, 2 and and 3;

Figure 11 shows a fourth water closet which includes a connecting arrangement like the arrangement illustrated in Figure 4;

Figure 12 is a side view of an overflow adaptor as used in Figures 8 to 11;

Figure 13 is a front view of the adaptor as shown in Figure 12;

Figure 14 is a top view of the adaptor shown in Figure 12;

Figure 15 is a side view of a siphon outlet bush;

Figure 16 is a top view of the siphon outlet bush as shown in Figure 15; and

Figure 17 is a cross section through the siphon outlet bush shown in Figure 15.

Referring to the drawings, there is shown in Figures 1 to 3 a water closet 2 comprising a toilet bowl 4 and a cistern 6. A siphon flushing device 8 is positioned in the cistern 6. Also positioned in the cistern 6 is an electrically powered extractor fan 10. The extractor fan 10 is positioned above the overflow level 12 of water 14 in the cistern 6 when the water closet 2 is in use.

The water closet 2 includes first conduit means 16 which is in the form of a flexible pipe and which extends from a lower part 18 of the siphon flushing device 8. The lower part 18 of the siphon flushing device 8, as shown, is adjacent a bottom wall 20 of a body part 22 of the cistern 6.

The water closet 2 also comprises switch means 24 which is provided on a toilet seat 26 and which is for causing the operation of the extractor fan 10 as will be described in more detail herein below.

The water closet 2 is such that during operation of the extractor fan 10, foul air from within the toilet bowl 4 is extracted via those apertures 28 which are provided around the rim 30 of the toilet bowl 4 and which are for admitting flushing water to the toilet bowl 4. When a person is seated on the toilet seat 26, much of the generated foul air is substantially trapped within the toilet bowl 4 and this foul air can speedily be removed via the apertures 28, the first conduit mean 16, the fan 10,

second conduit means 32 and a water overflow pipe 34, the second conduit means 32 connecting the output side of the extractor fan 10 with the water overflow pipe 34. By using the apertures 28 which are normally provided in the toilet bowl for admitting flushing water, it will be appreciated that there is no need to alter the design of the toilet bowl 4. This reduces on manufacturing costs and provide an incentive for people to modify their existing water closet. Furthermore, since the foul air is removed from the position from which it is created, namely inside the toilet bowl 4, it will be apparent that diffusion of the generated foul air into the entire room in which the water closet 2 is situated is substantially reduced or eliminated. This eliminates the need to remove air from the room in which the water closet 2 is situated and permits the immediate satisfactory use of the water closet by other persons. Because the foul air is removed via the existing water overflow pipe 34, it will be apparent that there is no need to knock holes in bathroom or toilet room walls and existing tiling or decorations need not be harmed. The siphon flushing device 8 can be of completely known and standard operating design except that it requires the small modification to enable the connection of the first

conduit means 16. Since the siphon flushing device is normally available on the market and made of a plastics material, they can easily be modified to enable the connection of the first conduit means 16, and new siphon flushing devices 8 could easily be moulded with the manufacturers having to make only minimal alterations to their existing moulding tools.

Referring specifically to Figure 1, it will be seen that the foul air removed from the apertures 28 passes into the duct 36 defined by the rim 30. The foul air then passes along the duct 38 and into one leg 40 of the siphon flushing device 8, see Figure 2. In Figure 2, the sliding diaphram valve which operates in all known siphon flushing devices 8 has been removed and only part of the connecting shaft 42 has been shown. This is in order to provide a clear illustration of the essential parts of the present invention. The siphon flushing device 8 operates for water flushing purposes substantially exactly as existing flushing devices 8 so that there is no water in the leg 40 and the top part 44 of the other illustrated leg is also not provided with water. Only the bottom part of the other illustrated leg where it leads into the diaphram chamber 46 is provided with the water 14. In Figure 2, there is also shown how

the first conduit means 16 is connected to the lower part 18 of the siphon flushing device. More specifically, the lower part of the siphon flushing device 8 has been provided with a small connect point 48 which, in a newly moulded siphon flushing device 8 would be formed as an integral moulded part of the siphon flushing device 8 or could be welded onto existing mouldings. As usual, the siphon flushing device 8 is held in position by a locking nut 50 screwed over a screw threaded part 52 of the siphon flushing device 8. The screw threaded part 52 extends through an aperture 54 in the bottom wall 20 of the body part 22 of the cistern 6. A washer 56 which may be made of a rubber material such as neoprene provides a seal between the siphon flushing device 8 and the bottom wall 20 in a known manner.

It is also to be mentioned that in the drawings, the usually employed ballcock arrangement has also been omitted for simplicity of illustration.

The first conduit means 16 is advantageously provided in the form of flexible plastics tubing. The flexible plastics tubing may form a convenient practical means of arranging the extractor fan in a convenient position within a wide range of cisterns 6 of differing designs. The plastics

material can be softened in hot water and set to the required shape. When the plastics material cools, it is sufficiently stiff to support the extractor fan 10 and yet it is flexible enough to avoid transferring vibrations from the motor of the extractor fan 10 to the cistern 6. Thus the various ventilator fittings can be arranged to avoid impeding the movement of the ballcock (not shown) in the cistern. Naturally, the extractor fan 10 will be set high enough in the cistern 6 to be above the possible maximum level of the water overflow in the cistern 6, ie above the water overflow level 12.

As can be seen most clearly from Figure 2, the second conduit means 32 is connected to the water overflow pipe 34 by means of a T-junction fitting 58 with the leg of the T-junction fitting 58 being connected to a pipe section 60 which extends into the water 14 as shown so that, in an overflow condition, water can pass up the pipe section 60 and out through the water overflow pipe 34. The outlet for the water is shown by dotted arrows 62 in Figure 2.

Because all of the ventilation fittings fit within the cistern 6, it will be appreciated that the cistern 6 can be of totally standard construction with a usual type lid 64.

Referring now to Figure 4, there is shown an alternative arrangement in which the second conduit means 32 is provided over a downwardly directed water overflow pipe 34. The horizontal outlet of the fitting 58 shown in Figures 2 and 3 is plugged and a pipe 66 is provided over the water overflow pipe 34. The pipe 66 may be an enlarged portion of the second conduit means 32, or attached to a smaller diameter pipe portion as shown in Figure 4.

Also as shown in Figure 4, the water overflow pipe 34 passes through the bottom wall 20 of the body part 22 of the cistern 6 and is held in position by a pair of complementary operating locking devices 68,70. The pipe 66 can be held in any desired position of overlap with the upper part of the water overflow pipe 34 by means of a pin 72 which passes through the pipe 66 and can rest on top of the water overflow pipe 34.

Foul air is able to vent down the pipe 66 to the water overflow pipe 34. The foul air is prevented from escaping into the cistern by the water 14 in the cistern which will be at its normal level 12A. Overflow water in a water overflow situation is able to pass unimpeded from the inside of the cistern 6 up the annular space between the pipe 66 and the water overflow pipe 34, and then down the water overflow pipe 34. The passage of the

overflow water is indicated by the dotted arrows 74.

Referring now to Figure 5, the toilet seat 26 is shown with normal spacer pads 74. These type of spacer pads occur on substantially all known toilet seats. In the present instance, the spacer pads 74 are left on the rear of the toilet seat 26. Resilient neoprene pads 76 are placed under the normal front spacer pads 74 as shown in Figure 5 to permit the seat 26 to be raised slightly above normal, for example to give a gap of 2-3mm between the rear spacer pads 74 and the upper rim surface 78 of the toilet bowl 4. One of the rear spacer pads 74 can then be provided with switch means 24, which may be a micro switch 80 as shown in Figure 6. The micro switch 80 may be positioned inside the rear spacer pad 74.

The micro switch 80 will normally be spaced apart from the upper rim surface 78 of the toilet bowl 4. When the toilet seat 26 is sat on, the weight of the person sitting on the toilet seat 26 will compress the resilient pads 76 with the result that the micro switch 80 will contact the upper rim surface 78 and will be caused to operate. The operation of the micro switch 80 then causes the extractor fan 10 to operate.

Wires 82 may be taped to the underside of the toilet seat 26 to connect the switch means, for example the micro switch 80, to a battery holder (not shown). Further wires (not shown) then connect the batteries in the battery holder to the extractor fan 10.

For seats having spacer pads 74 at the front end only of the toilet seat 26, switch means 24, for example a micro switch 80, may advantageously be fitted into a cavity in a seat pivot support 82, see Figure 7. The pivot support 82 may be seated on a layer of resilient material which would compress when the toilet seat 26 is in use, pushing the micro switch 80 in contact with the toilet bowl 4 and thus actuating the micro switch 80.

Referring now to Figures 8, 9 and 10, there is shown a third water closet 2 which is like the water closet 2 shown in Figures 1, 2 and 3. The drawings are such that Figure 8 corresponds generally to Figure 1, Figure 9 corresponds generally to Figure 2, and Figure 10 corresponds generally to Figure 3. Similar parts in the various drawings have been given the same reference numerals for ease of comparison and understanding.

In Figures 8, 9 and 10, the T-junction fitting 58 has been replaced by an overflow adapter 84. The overflow adapter 84 is shown most clearly in Figures 12,13 and 14.

Thus the overflow adapter 84 has a first stub section 86 for connecting to the pipe section 60. The connection can be effected by solvent welding. The overflow adapter 84 has a spigot 90 for connecting to the water overflow pipe 34. The overflow adapter 84 has an internally screw threaded section 92 for receiving a plug 94. The plug 94 has a screw threaded shank 96 which screws into the section 92. A washer 98 is located as shown on the plug 94 to provide a water tight fit. The plug 94 is provided with a slot 100 for enabling the plug 94 easily to be screwed into the section 92.

In the use of the adapter 84 as shown in Figures 8, 9 and 10 it will be appreciated that the plug 94 is not used and a horizontal overflow outlet pipe section 102 is employed, this pipe section 102 forming part of the water overflow pipe 34.

Figures 8, 9 and 10 also show a way of connecting the first conduit means 16 to the bottom of the leg 40 of the siphon flushing device 8. More specifically, a hole is drilled in the leg 40 and then a siphon outlet bush 104 as shown in Figures 15, 16 and 17 is located in the drilled hole. As shown in Figures 15, 16 and 17, the outlet bush 104 comprises a stub section 106 which projects outwardly from a flange 108. The flange 108 can be solvent welded in

position to the inside of the leg 40. As shown in Figures 9 and 11, the stub section 106 then projects outwardly from the leg 40 and is available for connecting to the pipe 16 via an angle bend pipe section 110.

Figures 8, 9 and 10 also illustrate a water supply inlet pipe 112 by means of which water is provided inside the cistern 6.

Referring now to Figure 11, there is shown part of a fifth water closet 2 in which the method of connecting the second conduit means 34 to the water overflow pipe 34 is like that employed in Figure 4. In Figure 11, similar parts as in earlier drawings have been given the same reference numerals for ease of comparison and understanding. It will be seen from Figure 11 that the overflow adapter 84 has been simply modified by undoing the connection with the pipe section 102 shown in Figures 9 and 10 and blanking off the section 92 with the plug 94. The method of connection and operation is then as described above with reference to Figure 4.

In all of the illustrated ventilator arrangements, the small volume of air which needs to be ventilated from the toilet bowl and the need to keep the air flow low to avoid noticeable draughts, means that the power of the motor for the extractor fan 10 can be relatively low and can be

provided by 6 volt or 9 volt dry batteries, or alternatively commonly available mains transformers suitably constructed to be safe when supplying apparatus associated with water. The work cycle will be sufficiently low to permit the use of small dry batteries such for example as torch batteries to give a useful life of, for example, six months to two years.

It is to be appreciated that the embodiments of the invention described above with reference to the accompanying drawings have been given by way of example only and that modifications may be effected. Thus, for example, different designs for ventilating foul air via the water overflow pipes 34 can be employed depending upon the position and siting of the water overflow pipes and whether or not the overflow pipes have outside access and, if not, depending upon whether the water overflow pipes can feed into an extractor trunking.

The ventilation apparatus required for the water closet may be produced as a kit of parts which could be used by plumbers for D-I-Y enthusiasts for modifying existing water closets. New water closets could be provided with new siphon flushing devices 8 operating as shown in the drawings. The use of extractor fans 10 which are battery driven avoids the need for special safety

provisions which would be required if mains electricity were being used. Furthermore, the use of battery power may make existing water closets easier and safer for the average D-I-Y enthusiast to modify. The cisterns can be any level cisterns from close-coupled to high level cisterns.

CLAIMS

1. A water closet comprising a toilet bowl, a cistern, a siphon flushing device positioned in the cistern, an electrically powered extractor fan positioned in the cistern above the overflow level of water in the cistern when the water closet is in use, first conduit means extending from a part of the siphon flushing device that contains air when the cistern contains water ready for flushing, second conduit means extending from the extractor fan to a water overflow pipe for the cistern, and switch means for causing operation of the extractor fan, the water closet being such that during operation of the extractor fan foul air from within the toilet bowl is extracted via those apertures around the rim of the toilet bowl that are provided for admitting flushing water to the toilet bowl so that the foul air is vented to atmosphere by passing through the apertures, the first conduit means, the fan, the second conduit means and the overflow pipe.

2. A water closet according to claim 1 in which the extractor fan is a battery powered extractor fan.

3. A water closet according to claim 1 or claim 2 in which the first conduit means connects to a lower part of the siphon flushing device adjacent to a bottom wall of the cistern.

4. A water closet according to any one of the preceding claims in which the overflow pipe extends through a side wall of the cistern above the normal level of water in the cistern.

5. A water closet according to any one of claims 1 to 3 in which the overflow pipe extends through a bottom wall of the cistern, the overflow pipe extending above the normal level of water in the cistern.

6. A water closet according to any one of the preceding claims in which the second conduit means is a separate piece of conduit which is connected to the overflow pipe.

7. A water closet according to any one of the preceding claims in which the switch means is provided underneath a toilet seat or within a pivot support of the toilet seat, and in which the switch means is automatically activated when the toilet seat is sat on.

8. A water closet according to claim 7 in which the switch means is arranged automatically to stop when a person gets up from the toilet seat.

9. A water closet according to claim 8 in which the switch means is a pressure activated switch means.

10. A water closet according to any one of the preceding claims in which the extractor fan is a centrifugal fan.

11. A water closet substantially as herein described with reference to the accompanying drawings.

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